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SAPC 14391
Copy 2 of 8

4 April 1957

MEMORANDUM FOR: Project Director

THROUGH : Contracting Officer

SUBJECT : "D" Rack - Recommendation for Cancellation

1. The "D" Rack was to be a fast read-out of PRF. In ELINT signal analysis, this is the first item of modulation data needed for establishment of the class of signal. With PRF and rough frequency data, a signal can usually be classified as a new or a previously identified type as well as the exact type if it is a previously identified type. There is a need for a faster read-out system for PRF and this need has been greatly increased as a result of the continuously operating System I, IV and V.

2. The "D" Rack was to have measured the interval between two signals (pulses) and compared this interval with the next nine intervals with an average value to be read-out if the interval variation did not exceed some pre-set value. If the interval variation was beyond this pre-set value, the instrument would register no result. It was believed by [redacted] and myself that 10 microsecond accuracy could be obtained by counting a single interval and 1 microsecond accuracy might be reached by averaging ten intervals.

3. This project has had low priority at R-W since the equipment was not essential to the read-out process. About five weeks ago, Dr. [redacted] dropped a suggestion that perhaps the project should be cancelled. A closer look than had been made for sometime was made on my visit to R-W early in March. The project was being carried out in the Instrument Division (the same group that produced the completely unuseable "C" Rack). The engineers were struggling with the job of compensating for the variation in recorder speeds. They had also built up rather sophisticated counting circuitry for comparing the first ten pulse intervals.

4. The prime question involved in the feasibility of the "D" Rack, in my opinion, is the threshold that will be necessary (between signal and noise) to operate the rack. On a theoretical basis and allowing for no attempt to make use of the known differences between pulse energy distribution and noise energy distribution, one can show that a minimum of 15 db. threshold would be needed. Recent Navy work on a similar problem indicates that 8 db. would be sufficient if a priori knowledge of pulses was cranked into the equipment. Then, too, the "D" Rack concept included the setting up of gates within which the pulses were to fall to further differentiate between pulse and noise. This should further reduce the threshold needed. Only experimental work could establish this threshold required.

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5. This prime question has never been answered to my satisfaction. During my early March visit, it was noted that the gate idea had not been used and therefore we could not expect a lowering of a threshold from this effect. It was also noted that no attempt had been made to make use of the difference between pulses and noise. These points were stressed and it was suggested that the engineers investigate this point and concurrently put together their work for a test to be viewed the week of 25 March.

6. Upon inquiry during the week of 25 March, the men asked if they could wait until the last of the week for the demonstration. The equipment was demonstrated on Thursday. No provision existed for compensating for the recorder speed. The signals in use were clean laboratory pulses produced with good wave form and with infinity signal to noise ratio (no noise). No gates nor noise differentiation effect was in use. The system counted PRF nicely but this demonstrates nothing since a commercial counter costing $1,000, such as the Hewlitt Packard and Berkeley would have done as well. Upon questioning, they said they had no solution for the recorder speed problem. They had tried the rack on live tapes but the signal to noise ratio was always too low to operate their equipment, they reported. Although they had not measured the necessary threshold, they estimated that 30 db. would be needed. A theoretical study showed 22 db. would be necessary with a 2% error (20 μ sec. on a 1000 cycle PRF). They doubted if better could be done than 25 db. [redacted] was not available. 25X1A

7. I discussed this unencouraging demonstration with [redacted] 25X1A He said that although they would continue the project if I so desired, he thought there was no future in it and felt that it should be discontinued. He proposed some methods of trying to accomplish the requirement. These I judge to have a less likelihood of success than the original approach. They also required considerable time to read-out the result. He added that he felt that perhaps 20 db. of threshold would be required and a lower accuracy than stated above would result.

8. Since a 20 db. threshold would be of very little, if any, value and his suggestions were not believed to result in any less threshold than the original plan, it is recommended that the project be dropped. It is believed that the accuracies stated originally can not be met, but that a considerable reduction in threshold might be obtained. With [redacted] 25X1A having no faith in the project (neither the obtaining of a useable threshold nor the correction of tape speed variations), it seems doubtful if anything of value can come from extending the project.

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[redacted] 25X1A

25X1A [redacted]

APPROVAL:

25X1A [redacted]

ELINT Staff Officer

APR 1957

Date

Distribution:
Copies 1 and 2 - Project Director
25X1A 3 - [redacted]
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I think this is just another symptom of the lack of adequate supervision which has been characteristic of much of R-W's work. The Instrumentation Division was apparently given this whole job of ground read-out equipment without having been advised by Burt of the characteristics desired and were not kept informed of the discussions that took place from time to time with respect to details.

25X1A [redacted]

ELINT Staff Officer

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